

Rainy Days.—The number of days, during the month, on which some rain or snow fell is as follows: Alpena, 27; Buffalo, 26; Cleveland, 25; Detroit, 21; Erie, 25; Grand Haven, 22; Morgantown, 21; Oswego, 25; Pittsburgh, 22; Port Huron, 27; Rochester, 27; Toledo, 21—from which it will be seen that in the Lake region the precipitation has been remarkably frequent. The number of days on which precipitation has occurred in the remaining districts is as follows: New England, 9 to 18; Middle Atlantic States, 6 to 14; South Atlantic States, 9 to 13; Gulf States, 6 to 18; Ohio valley and Tennessee, 5 to 15; Northwest, 3 to 17; Rocky Mountain stations, 5 to 11.

Cloudy Days.—The number of days on which the cloudiness has equalled eight on a scale of ten, as reported by voluntary observers, ranges as follows: New England, 6 to 25; Middle States, 4 to 25; South Atlantic States, 4 to 13; Gulf States, 5 to 17; Ohio valley and Tennessee, 6 to 20; Upper Lake region, 15 to 22; Northwest, 1 to 13.

Drouths.—A scarcity of water is reported from some portions of the Middle States, New England and the Northwest, owing to the continued cold weather, which has prevented the snow from melting. The lack of rain in California has caused some apprehensions on the part of farmers that agricultural interests may suffer.

RELATIVE HUMIDITY.

The mean relative humidity for the month, as reported from the Signal Service stations, ranges as follows: in New England, 69 to 78 per cent.; Middle Atlantic States, 66 to 80; South Atlantic States, 62 to 74; Gulf States, 57 to 74; Indian Territory, Arkansas and Tennessee, 55 to 72; Lower Lake region, 72 to 80; Upper Lake region, 61 to 79; Ohio valley and Northwest, 64 to 74; Cheyenne, 66; Denver, 51; Pike's Peak, 65; Santa Fe, 46; Virginia City, 62; Salt Lake City, 89; Portland, Or., 82; San Francisco, 66; San Diego, 58. The unusually moist atmosphere at Salt Lake City was accompanied by a dense fog, which hung over the station almost continually from the 5th until the 20th.

WINDS.

Prevailing winds.—These are shown by the arrows on chart No. II. They have very generally been from N., NW. or W. over the entire country from the Rocky Mountains eastward to the Atlantic, except in Tennessee and the Ohio valley, where they have been more variable.

Total movement of the air.—The following are the largest total movements of the air as recorded at the Signal Service stations: Pike's Peak, 19,641 miles; Cape May, 16,407; Sandy Hook, 14,954; Thatcher's Island, 13,669; Kitty Hawk, 12,166; Cape Lookout, 11,737; Barnegat, 11,445; Erie, 11,289; Grand Haven, 10,209; Wood's Hole, 10,168. The smallest movements have occurred at the following stations: Salt Lake City, 1,636 miles; Nashville, 2,648; Virginia City, 2,684; Portland, Or., 2,727; Dubuque, 2,854; San Diego, 3,079; San Francisco, 3,115; Shreveport, 3,326.

Highest Winds.—Among the highest hourly wind velocities reported from Signal Service stations are the following: Boston, 29th, E. 57; Buffalo, 15th, W. 60; Bismarck, — 64; Cape May, 9th, W. 72, 17th, NW. 60; Eastport, 18th, SE. 54, 29th, E. 69; Erie, 16th, W. 52; Grand Haven, 15th, SW. 66; Knoxville, 8th, SW. 54; Malone, 15th, S. 52; Marquette, 9th, W. 54; Milwaukee, 15th, W. 54; Morgantown, 8th, W. 54; New York, 9th, W. 60, 16th, NW. 60; Newport, 9th, SW. 60; Pembina, 15th, NW. 54; Pike's Peak, 7th, — 66, 29th, — 90; Sandy Hook, 9th, W. 84, 16th, NW. 63, 18th, NW. 60, 30th, W. 68; Thatcher's Island, 29th, E. 60. The observer at Detroit reports that during the storm of the 15th and 16th, in which the wind attained a maximum velocity of 35 miles per hour from the W., the changes in pressure and temperature were unprecedented in respect to magnitude and rapidity. A fall in pressure of .20 of an inch was recorded in two hours, followed by a rise of .86 in eight hours. The temperature rose 17° in eight hours and subsequently fell 32° in the same interval. The approach of this storm was fully anticipated by the Cautionary Signals. The high winds accompanying low barometer No. V, appear to have been very severe in Newfoundland. According to reports from St. Johns falling barometer and gales continued throughout the 13th, the barometer falling to 28.60 at 9 a. m. A *water-spout* was observed at Wilmington, N. C., on the 29th, at 8 a. m. At Augusta, Ill., a violent *whirlwind* occurred on the 8th, at 9 a. m.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily weather indications with the telegraphic reports for the succeeding 24 hours shows a percentage of verifications of 88.1 and a percentage of omissions of 0.9 in detail. The percentages have been as follows: for weather, 95.2; wind, 86.6; temperature, 85.6; barometer, 85.0. The geographical distribution of the verifications has been as follows: New Eng. 88.9; Mid. States, 90.2; S. Atlantic, 90.4; E. Gulf States, 89.0; W. Gulf States, 87.8; Lower Lake region, 89.3; Up. Lake region, 88.1; Tenn. and the Ohio valley, 90.0; Up. Miss. valley, 85.1; Lower Mo. valley, 80.2.

Cautionary Signals.—There have been displayed during the month at U. S. S. stations 192 cautionary storm signals; of these 142 were verified at the stations, and 19 others, or 83 per cent. in all, verified within

a hundred miles of the stations. Thirty were not justified. Seventy-four cases are reported in which signals were needed but not displayed.

NAVIGATION.

Height of rivers.—The highest and lowest readings on the Signal Service river-gauges are given in the table on chart No. III. From which it appears that the Red river at Shreveport and the Miss. from Cairo to New Orleans were highest during the first ten days of the month and lowest at its close. At Cairo the lowest reading of the month was on the 30th, when the river was only three inches above the low watermark of December, 1861. In the Ohio and tributaries the lowest waters occurred about the middle of the month.

Ice in rivers is reported as follows: *Mississippi river*—Davenport, closed 2nd, men crossed 4th, teams 10th. St. Louis, navigation interrupted 2d, river gorged 4th, navigation resumed 7th, suspended 9th, river frozen over 11th. Cairo, navigation suspended to points above on the 2nd, and to points below 23d. Keokuk, closed 16th. Nashville, ice in river 19th, 20th, 30th and 31st. Memphis, river gorged 30th. La Crosse, ice averages 19 inches in thickness, and some was cut 31 inches thick, on the 31st. *Missouri river*—At Lower Brule Agency, closed 1st. Leavenworth, frozen at shore during month, and after the 20th channel closed. Plattsmouth, Neb., closed 3d. St. Joseph, Mo., ice bridge 5th. *Ohio river*—Cincinnati, navigation closed 9th, and river frozen over 10th. Laconia, Ind., full of floating ice 9th. Louisville, Kentucky, navigation suspended 9th, river gorged 15th. Pittsburg, frozen over 10th. Portsmouth, Ohio, gorged 10th.

For other places the following notes have been received: On the 1st, Albany, N. Y., Erie canal closed; Lyndon, Ill., Rock river closed; Logansport, Ind., Wabash and El rivers frozen over; Alpena, Mich., Thunder Bay river frozen over (and harbor frozen 8th); Chicago, Ill., navigation closed. 2nd, Monticello, Iowa, Maynocketa river frozen over; Trenton, N. J., Delaware and Raritan canal frozen over; Cincinnati, Miami canal closed. 3rd, Shelburne, N. H., Androscoggin crossed by pedestrians (and on 10th by teams). 4th, Trenton, N. J., Delaware river frozen over. 5th, New Geneva, Pa., on account of ice boats stopped running. 6th, Buffalo, N. Y., navigation closed. 8th, Decatur, Ill., Sangamon river frozen over. 9th, Philadelphia, Pa., Schuylkill and Delaware rivers frozen over (ice gorges in Delaware 17th and 27th); Morgantown, W. Va., Monongahela river frozen over; Knoxville, Tenn., Holston river closed 9th (first time in thirteen years). 10th, Bloomfield, Wis., Geneva lake frozen over; Bangor, Me. and Erie, Pa., navigation closed. 12th, Washington, D. C., Potomac closed. 15th, Salem, N. J., Salem creek closed (ice 10 in. thick 31st); Detroit, Mich., navigation closed (ice in river 4th to 12th, gorged 12th). 16th, Grand Haven, Mich., navigation closed. 17th, Cooperstown, N. Y., Otsego lake closed; Port Huron, Mich., Black river frozen, and an ice bridge across the St. Clair. 18th, Asheville, N. C., the French Broad river was crossed on ice by cattle, &c., for several days about this date. This is the first time that this has ever occurred within the knowledge of the observer. 19th, Fall River, Mass., Taunton river and Narragansett bay frozen over. 20th, West Point, N. Y., large masses of floating ice; Wappinger's Falls, N. Y., navigation on Hudson ceased. 25th, Standish, Me., Sebago lake frozen; has not been known to freeze *with the water so low* since 1838.

TEMPERATURE OF WATER.

The maximum and minimum temperatures at the bottom of the water are given in the table on chart No. II. The highest maxima are: Charleston, 53°; Jacksonville, 54°; Mobile, 55°; St. Marks, 50°; Punta Rossa, 72°; Key West, 84°, which unusually high temperature was observed on the 24th. The lowest maxima are: 32°, Omaha; 33°, St. Louis and Milwaukee; 34°, Grand Haven and Marquette, 36°, Chicago, Duluth and Knoxville.

Minimum water temperatures.—The lowest are: 28°, New York; 29°, Esanaba; 30°, Portland, Me., Wood's Hole; 31°, Baltimore and Memphis. The highest minima are: 54°, St. Marks; 52°, Punta Rossa; 45°, Key West, Jacksonville and Mobile; 43°, Charleston; 41°, Savannah.

Ranges of water temperatures.—The largest ranges of water temperature during the month are the following: Key West, 39°; Punta Rossa and Baltimore, 14°; Springfield, Norfolk and Wilmington, 11°; Augusta, Charleston, Mobile, New York and New London, 10°. Smallest ranges: Omaha, 0°; St. Louis, 1°; Knoxville and Duluth, 3°; Keokuk and San Francisco, 4°.

Ocean temperatures.—December 28th, bark Speranza, in lat. 38° 19' N., 71° 10' W., found the temperature of the water 68°, after two hours, 75°, and one hour subsequently 76°. All at once found the water ruffling with a very heavy swell, and supposed it to be the boundary of the Gulf stream, as six miles in a NW. direction found the water only 55°.

ATMOSPHERIC ELECTRICITY.

Thunder and lightning-storms have occurred as follows: 8th and 9th, New London, Conn. 17th, Galveston, Texas; Pt. Pleasant, La. 18th, Newport, R. I.; New London and Mystic, Conn.; Dover, Del.; New Orleans, La.; Mendon, Billerica, Westboro', Fall River, Waltham and Boston, Mass.; Brookhaven, Miss.; Vineland, N. J. 28th, Galveston, Texas; Wilsonville, Ala. 31st, Indianola and Austin, Texas.

Auroras were observed as follows: 4th, Yankton, Dak. 10th, Boston, Quincy, and Somerset, Mass.